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PRESERVATION

Tech Notes

NATIONAL PARK SERVICE
U.S. DEPARTMENT OF THE INTERIOR
WASHINGTON, D.C.

METALS

NUMBER 2

Restoring Metal Roof Cornices

Richard Pieper
Director of Preservation
Jan Hird Pokorny, Architects and Planners

32 EAST 64TH STRET
New York City

32 East 64th Street is a prominent cooperative apartment building at the corner of Madison Avenue and Sixty-fourth Street in New York City's Upper East Side Historic District. Known as "The Verona" when constructed in 1907, the building was designed in the "Neo-Venetian Renaissance" style. The first floor of the 10-story structure is rusticated limestone, while the upper floors are iron-spotted buff Roman brick, with intermediate cornices, balustrades, and window surrounds of buff matte glazed terra cotta intended to imitate stone. One of the building's most prominent features is its oversized classically detailed sheet metal cornice. Close to 8' high, it projects nearly 6' from the masonry facade and is 260' long. Following a careful study of the deteriorated condition of the cornice, repairs were undertaken to renew this prominent feature of the building.

Problem

In 1986, the firm of Jan Hird Pokorny Architects was hired by the building owners to inspect and evaluate the condition of the cornice and provide recommendations for any necessary corrective work. The cornice was

Decorative metal roof cornices should be repaired rather than replaced wherever possible.

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Figure 1. Large steel trusses cantilever out from the masonry parapet to support the cornice. Metal facing of the cornice was bolted to small iron or steel ribs (as at left). Wire ties helped to pull the center of the cornice tight to the bottom member of the truss. Photo: Richard Pieper.

found to be extremely deteriorated. Large sections of stamped zinc ornament were perforated and separating from the brake-formed galvanized steel that formed the lineal moldings of the cornice.

The unusually large size of the cornice made it possible to inspect its interior (*see figure 1*). It was accessible through two small hatches in the sloped roof covering the rear of the cornice trusses. The cornice itself is supported by steel trusses, which are in turn attached to the structural steel frame of the building (*see figure 2*). The top and rear slopes of the cornice trusses are covered with structural clay tiles supported by 2" steel tee purlins set perpendicular to the trusses. The tiles served as a base for the terne-plated steel standing seam roofing, which had rusted through in spots on the top slope. The standing seam roof on the rear slope of the cornice had been coated with asphalt but was in relatively good condition. In spite of recurrent leakage, the tiles were in satisfactory condition, and the trusses showed only small areas of superficial rusting. The galvanized steel facing of the cornice was generally in good condition, but about 30 lineal feet (roughly 10 percent) of the steel at the base of the cornice had rusted where the galvanized facing entered the masonry wall. (Water leaking into the cornice had collected there.) In addition, large rust holes had formed behind nearly all the decorative lions' heads on the crown of the cornice, where holes in the exposed and seldom painted ornament allowed bird nests and moisture to accumulate. The metal of the cornice soffit was in surprisingly good condition, perhaps because water entering there was able to weep through lapped seams of the steel facing.

Other leakage was attributable to a small sloped section at the front of the

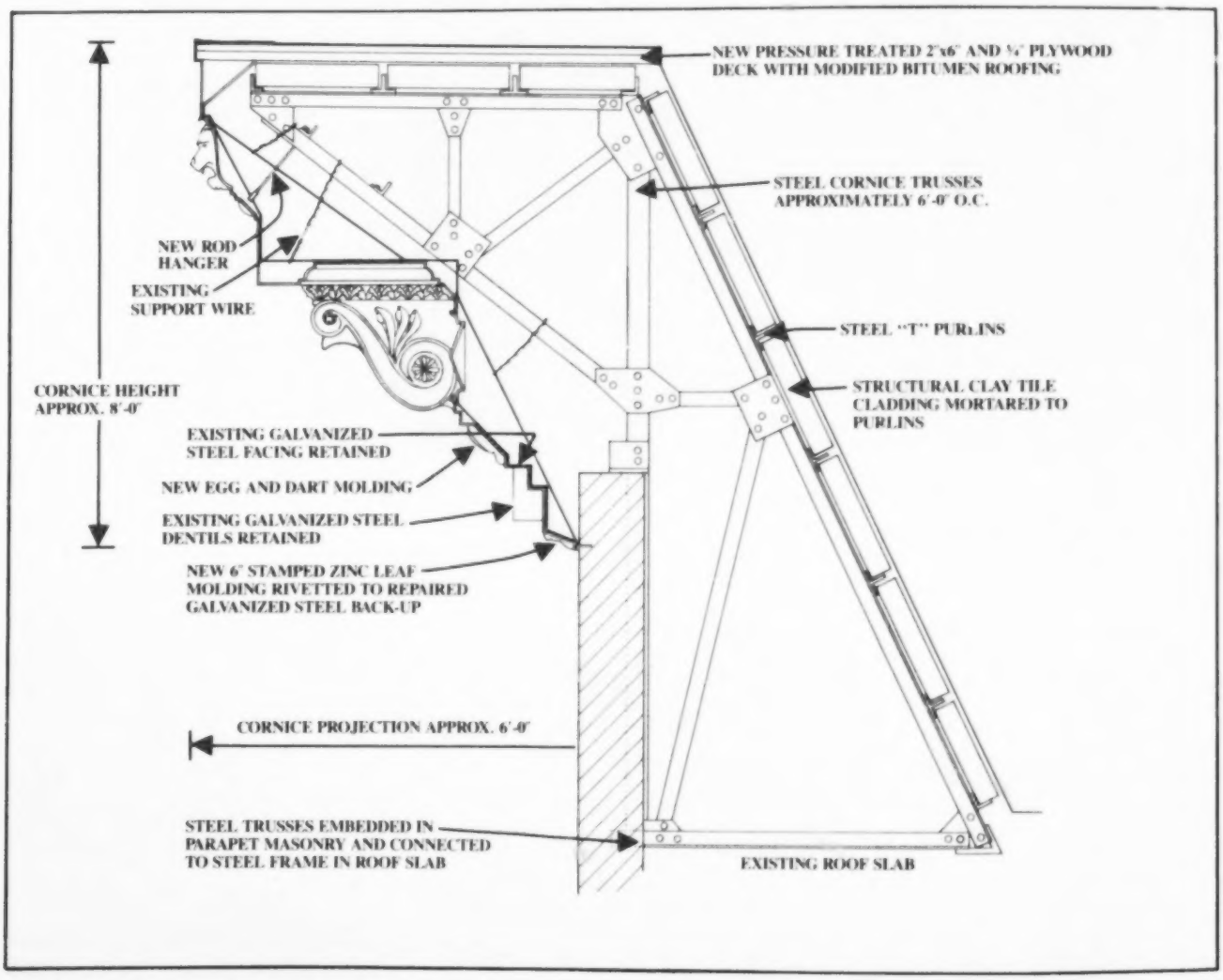
NEW PRESSURE TREATED 2"x6" AND ¾" PLYWOOD DECK WITH MODIFIED BITUMEN ROOFING
STEEL CORNICE TRUSSES APPROXIMATELY 6'-0" O.C.
NEW ROD HANGER
EXISTING SUPPORT WIRE
STEEL "T" PURLINS
STRUCTURAL CLAY TILE CLADDING MORTARED TO PURLINS
CORNICE HEIGHT APPROX. 8'-0"
EXISTING GALVANIZED STEEL FACING RETAINED
NEW EGG AND DART MOLDING
EXISTING GALVANIZED STEEL DENTILS RETAINED
NEW 6" STAMPED ZINC LEAF MOLDING RIVETTED TO REPAIRED GALVANIZED STEEL BACK-UP
CORNICE PROJECTION APPROX. 6'-0"
STEEL TRUSSES EMBEDDED IN PARAPET MASONRY AND CONNECTED TO STEEL FRAME IN ROOF SLAB
EXISTING ROOF SLAB

Figure 2. Cornice section shows the manner in which the cornice was supported and attached to the building. Drawing: Michael Devonshire.

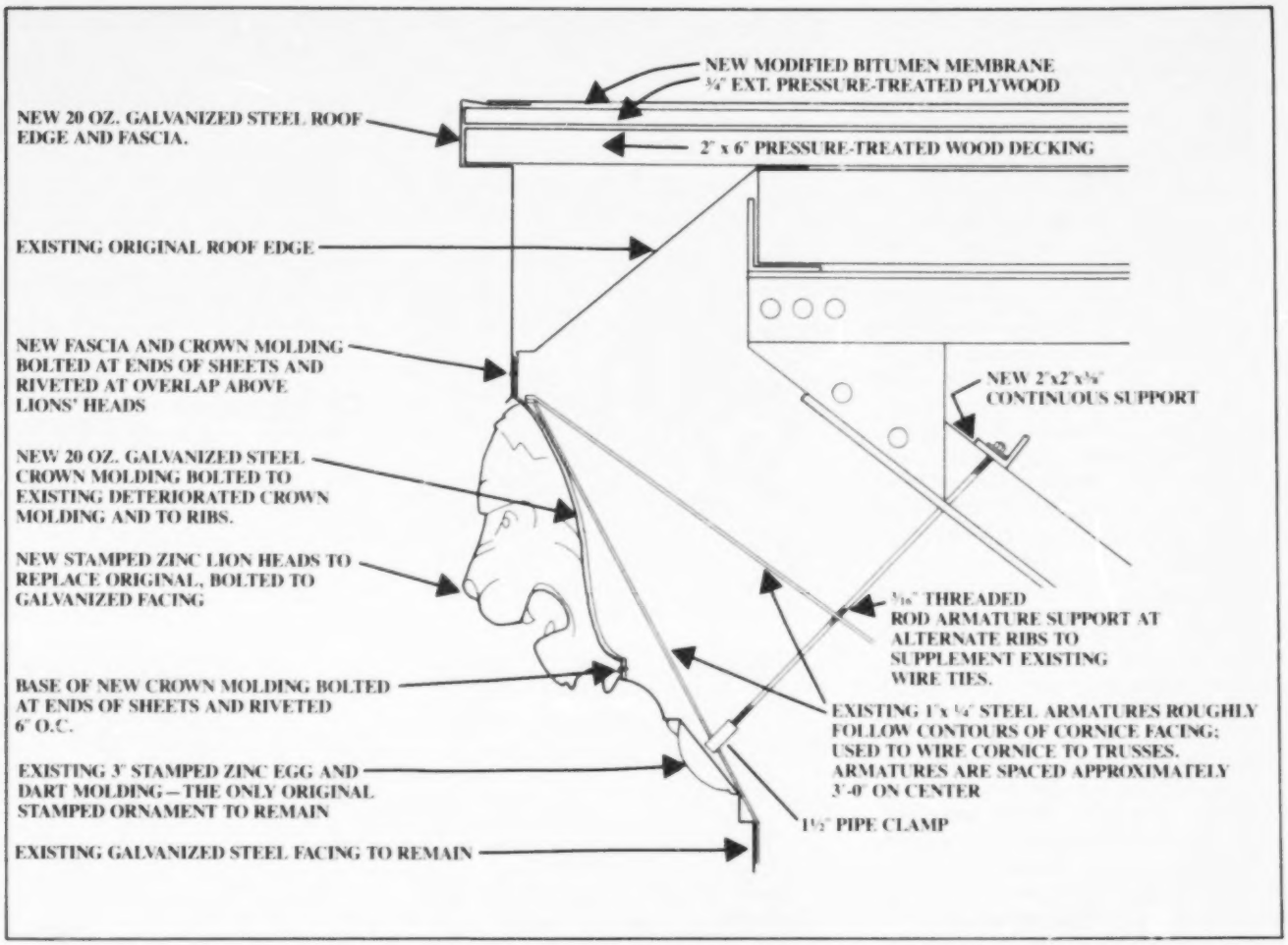
NEW MODIFIED BITUMEN MEMBRANE
¾" EXT. PRESSURE-TREATED PLYWOOD
NEW 20 OZ. GALVANIZED STEEL ROOF EDGE AND FASCIA.
2" x 6" PRESSURE-TREATED WOOD DECKING
EXISTING ORIGINAL ROOF EDGE
NEW FASCIA AND CROWN MOLDING BOLTED AT ENDS OF SHEETS AND RIVETED AT OVERLAP ABOVE LIONS' HEADS
NEW 2"x2"x⅛" CONTINUOUS SUPPORT
NEW 20 OZ. GALVANIZED STEEL CROWN MOLDING BOLTED TO EXISTING DETERIORATED CROWN MOLDING AND TO RIBS.
NEW STAMPED ZINC LION HEADS TO REPLACE ORIGINAL, BOLTED TO GALVANIZED FACING
⅜" THREADED ROD ARMATURE SUPPORT AT ALTERNATE RIBS TO SUPPLEMENT EXISTING WIRE TIES.
BASE OF NEW CROWN MOLDING BOLTED AT ENDS OF SHEETS AND RIVETED 6" O.C.
EXISTING 1"x ¼" STEEL ARMATURES ROUGHLY FOLLOW CONTOURS OF CORNICE FACING; USED TO WIRE CORNICE TO TRUSSES. ARMATURES ARE SPACED APPROXIMATELY 3'-0" ON CENTER
EXISTING 3" STAMPED ZINC EGG AND DART MOLDING—THE ONLY ORIGINAL STAMPED ORNAMENT TO REMAIN
1½" PIPE CLAMP
EXISTING GALVANIZED STEEL FACING TO REMAIN

Figure 3. Detail section shows the new cornice crown molding, edge cap and roofing that corrected a construction flaw in the original fabrication. Drawing: Michael Devonshire.

cornice above the crown molding (*see figure 3*). Perhaps due to a fabrication error, the trusses were too tall to receive the cornice facing as designed. Since the facing could not be raised further vertically without the top inside corner of the modillions touching the bottom chord of the trusses, a gap existed between the top of the sheet metal facing and the cornice roof when the facing was installed. The gap was closed by a short sloped piece of galvanized steel sheet metal that was not visible from the street.

By far the most serious problem with the cornice was the deterioration of the stamped zinc ornament applied to the exterior of the galvanized steel facing. The large 12"-wide zinc modillions projected 24" from the cornice entablature and were in poor condition. The stamped zinc had fractured where integral leaf moldings met the scrolled sides of the modillions, allowing them to separate from the soffit. As a previous temporary safety measure, holes had

Figure 4. As shown in this view, the molding applied to the modillions was extremely deteriorated. A more serious problem was that most of the zinc modillions had fractured where the integral leaf moldings met the scrolled sides, allowing them to separate from the soffit. As a previous temporary safety measure, holes had been cut in the soffit panels to pass supporting wire beneath the modillions. Photo: Richard Pieper.

been cut in the soffit panels to pass supporting wires beneath the modillions (*see figure 4*). Cracks indicative of metal fatigue were also present in the fronts and sides of the modillions.

Most of the applied stamped zinc moldings were also extremely deteriorated. The cornice had been infrequently painted, and much of the ornament was thinned, perforated or broken through dissolution and embrittlement of the zinc. Lions' heads on the crown molding could easily be punctured and were tenuously attached to the galvanized steel with deteriorated soldered joints. Sections of leaf molding and egg and dart molding at the base of the cornice had fallen or been removed. The remaining molding was in poor condition (*see figure 5*).

Figure 5. Most of the egg and dart molding on the cornice had deteriorated over the years and required replacement. Photo: Richard Pieper.

Solution

Inspection showed that the galvanized steel facing of the cornice was in repairable condition but that much of the applied zinc ornament was not salvageable. The trusses supporting the cornice, the steel tee purlins and the structural clay tile were generally in excellent condition. Budget estimates were prepared for repair-in-kind and for replacement of the cornice. The architects considered two replacement alternatives; one with new metal and one with glass-fiber reinforced plastic. Repair of the existing cornice facing was the most economical alternative. The New York City Landmarks Preservation Commission also favored repair rather than replacement. Repair of the cornice included replacement of all modillions and nearly all applied zinc moldings; installation of new galvanized steel crown molding and cornice roof edge details; placement of new roofing on the top of the cornice; insertion of new rod hangers to supplement existing wire hangers supporting the face of the cornice, and repainting both the interior and exterior (*see figure 6*).

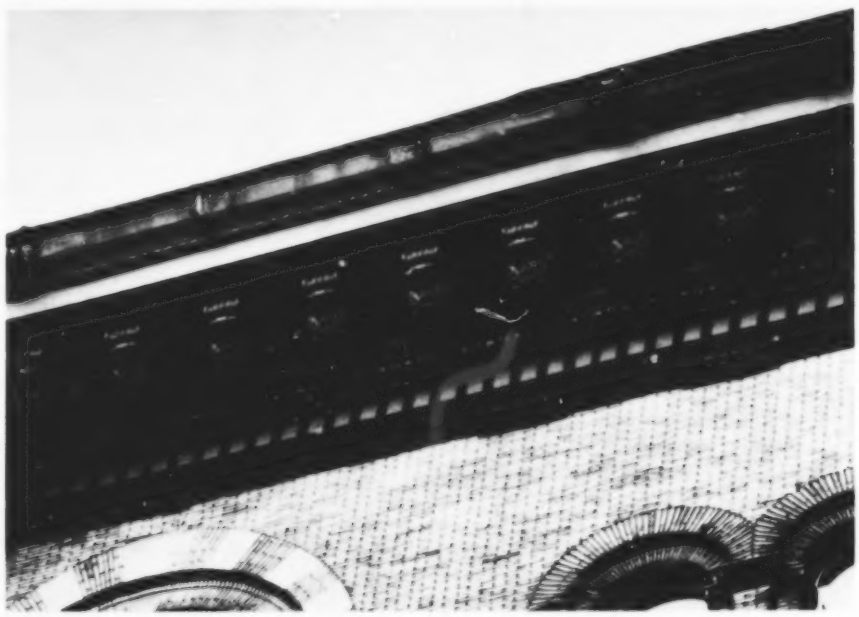

Figure 6. Three of the components of the metal cornice which required replacement because of serious deterioration are shown in this view. They are the lions' heads on the crown molding (several are missing due to failed soldered joints), modillions, and the egg and dart molding at the base of the cornice. The brake-formed galvanized steel that comprised the lineal moldings of the cornice, the soffit and dentil band were in sound condition. Photo: Richard Pieper.

Work Description

Visual examination of the exterior of the cornice with binoculars showed that significant sections of stamped molding had previously separated from the galvanized steel substrate and had fallen or been removed. From the interior of the cornice, it was not possible to closely examine the remaining applied zinc ornament other than the modillions. The height and depth of the cornice also made it impossible to examine all portions of the front face of the cornice from swing stage scaffolding. For these reasons, a 20' long fixed tubular scaffolding tower was erected on sidewalk bridging to facilitate inspection of a representative portion of the exterior.

The scaffolding was left in place after the inspection and was eventually incorporated into construction scaffolding. Two scaffolding work levels were required: a lower level to work on modillions and molding replacement below the soffit, and an upper level to replace roof edging, crown molding, and lions' heads.

Paint Removal

Existing paint was flaking and peeling. Because most of the zinc ornament was to be replaced, it was not necessary to remove paint from the entire cornice facing. Consideration was given to chemical, heat, and water spray removal techniques, but chemical

Figure 7. A water spray was used to remove most of the paint from the components of the cornice that were being retained. With the more delicate egg and dart molding, care was required to avoid possible dimpling of the metal. Steps were taken to keep water from collecting inside the cornice. Photo: Michael Devonshire.

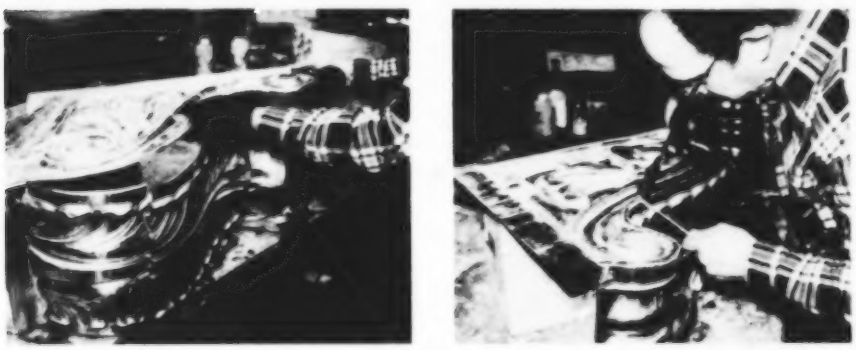

Figure 8. The modillions consisted of 6 stamped pieces soldered together by the installer. Photo: Richard Pieper.

removal was dismissed because of environmental and public safety considerations and potential problems of the residue soiling the exterior masonry. Tests of water spray removal techniques showed that successful cleaning was achieved with a rotating tip spray device, which removed nearly all paint without harming the metal substrate (*see figure 7*). Care was required when spraying the zinc molding that was to remain, since the water pressure required to remeve the paint was sufficient to dimple the projecting metal of the ornament. Water and paint chips were collected in troughs of sheet plastic. Paint residue was gathered to the extent possible, but the spray effluent was difficult to control and some spilled onto the building and sidewalk bridging. In some areas it was necessary to supplement water removal with light hand scraping, using a flat scraper after most paint had been removed.

A number of factors contributed to the success of the cleaning and paint removal technique. Because the cornice on this building was accessible from behind, it was possible to monitor and remove any excess water that penetrated various openings in the cornice caused by deterioration. Weep holes at the base allowed water to seep out of the cornice. For other projects where less extensive work is required and particularly where the cornice is backed with wood, other paint removal and cleaning methods may be necessary.

Ornament Removal and Fabrication

The historic zinc ornament originally was soldered in place after the galvanized facing was raised and installed. In most cases moldings were continuously soldered but in some cases only tack-soldered in place. (Soldered joints generally were in good condition even though moldings had deteriorated.) Deteriorated moldings were removed by de-sweating joints with propane torches.

New stamped zinc ornament closely resembling the original was available in stock sizes from a Midwest manufacturer. In some cases it was necessary to gang two moldings (an 8" egg and dart and 3" bead and disk moldings for instance) where a larger original molding had incorporated two designs. Modillions were the only zinc elements requiring significant assembly prior to installation. Modillions were comprised of 6 stamped pieces, which were soldered together in a shop by the contractor prior to installation. While preassembled ornament was available from the manufacturer, assembly by the installer greatly simplified shipping and assured that mounting flanges met installation requirements (*see figure 8*). Since the new stock modillions did not incorporate a leaf molding at the top as did the originals, it was necessary to attach new mitered leaf molding sections to the top of each modillion. New galvanized steel back-up was attached at the top of the modillions for better anchoring to the soffit and to avoid riveted zinc to zinc joints which might fracture in this location (as did the originals due to metal fatigue). New modillions were the same size (24"L x 22"H x 12"W) as the originals, but were not precisely the same design (*see figure 9*). This difference in appearance is not discernible from the street below. (New molds matching the original modillions could have been fabricated at additional cost if this had been necessary for authenticity.)

Ornament Repair and Installation

The new ornament was attached to the existing galvanized steel backing with stainless steel pop rivets. This method of attachment is standard in the sheet metal industry today and is much simpler for field application than soldering. By using rivets instead of soldering, it wasn't necessary to clean the steel backing to bright metal. Both the galvanized steel facing and the zinc ornament were primed with zinc dust / zinc oxide primer prior to rivetted installation.

Pop rivets were set through flat surfaces on the top and bottom flanges of each molding and were spaced no further than 6" apart (*see figure 10*). Modillions were pop riveted to the soffit through the new galvanized backing used to support the leaf moldings. New galvanized steel flanges

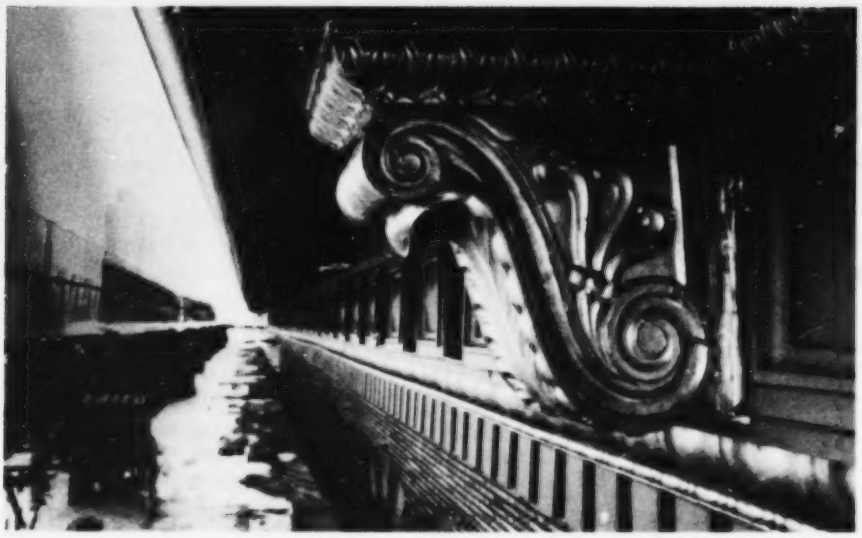

Figure 9. The new modillions, shown here in an installation test, were the same size as the originals but not precisely the same design. Had the difference in appearance been discernible from the street below, matching pieces could have been manufactured at an additional cost. Photo: Michael Devonshire.

attached the modillions to the entablature. Variations from 90 degrees in the soffit/entablature angle were taken up by the new rear flanges at the entablature.

New galvanized steel crown moldings at the top of the cornice and new galvanized steel backing for the leaf molding at the base were attached to the existing galvanized facing with stainless steel stove bolts, rather than rivets, because of the weight of the sheets.

The 1¼" x ¼" ferrous armatures to which the cornice facing was bolted were lightly rusted, but in satisfactory condition. The original system of twisted wires which attached these armatures to the trusses was also in good condition, but appeared haphazard. Additional threaded rod and clamp anchors were added to supplement these wires. Rods were also

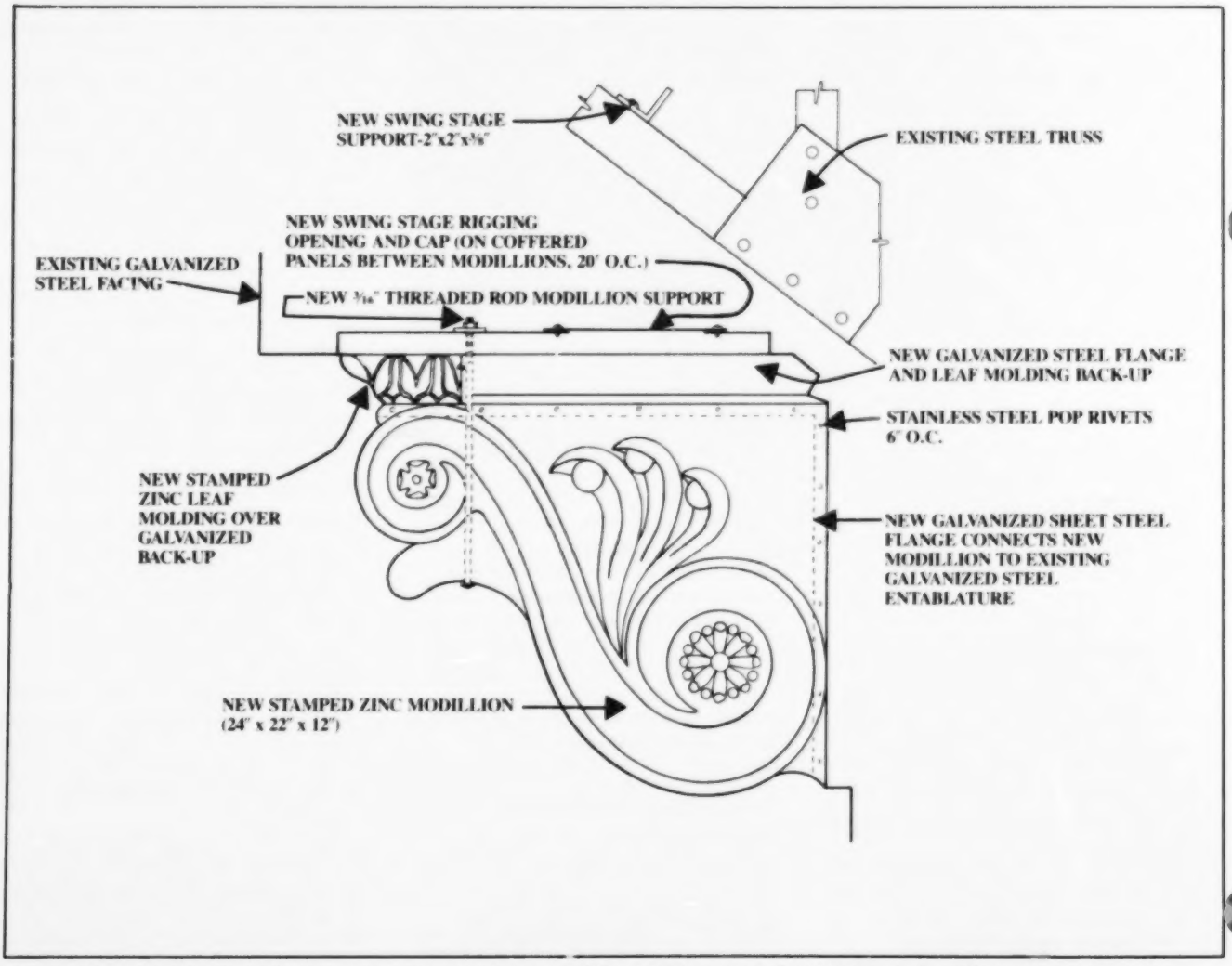
NEW SWING STAGE SUPPORT-2"x2"x⅜"
EXISTING STEEL TRUSS
NEW SWING STAGE RIGGING OPENING AND CAP (ON COFFERED PANELS BETWEEN MODILLIONS, 20' O.C.)
EXISTING GALVANIZED STEEL FACING
NEW ⅜" THREADED ROD MODILLION SUPPORT
NEW GALVANIZED STEEL FLANGE AND LEAF MOLDING BACK-UP
STAINLESS STEEL POP RIVETS 6" O.C.
NEW STAMPED ZINC LEAF MOLDING OVER GALVANIZED BACK-UP
NEW GALVANIZED SHEET STEEL FLANGE CONNECTS NEW MODILLION TO EXISTING GALVANIZED STEEL ENTABLATURE
NEW STAMPED ZINC MODILLION (24" x 22" x 12")

Figure 10. Detailed section shows the supporting technique for the new modillions, which consisted of riveted galvanized steel flanges and threaded rods. Drawing: Michael Devonshire.

added to attach modillions to the soffit in the event that the new leaf molding flange rivets broke.

Repainting

The existing cornice was painted dark brown. Examination of finishes on sheltered areas of molding clearly showed that the cornice had originally received a buff sanded paint finish, which was intended to imitate stone and to complement the buff hues of the terra cotta and limestone. A slightly darker color than the original was chosen for repainting since it would not readily show soiling and would complement the appearance of both cleaned and uncleaned facade masonry.

Because it seemed likely that paint maintenance of the cornice would be neglected, a zinc dust/zinc oxide primer was selected to give the cornice a measure of galvanic protection if the paint film was compromised. The primer was used on all surfaces, including the back of the new ornament and the interior of the cornice. The primer and two coats of alkyd finish paint were brush applied (*see figure 11*).

Project Evaluation

The repair approach for the cornice work on this building exemplifies the preservation treatment recommended for distinctive historic features. Large roof cornices increasingly are under close scrutiny by persons involved in life/safety issues. Rather than removing or replacing entire cornices, many can be repaired and structurally reinforced as required. The thoughtful planning study which was prepared for 32 East 64th Street outlined the repair and replacement options and provided for a sound program of repair and upgrading. The recommended repair scheme was adopted and successfully implemented by the owners' association.

Repair of the cornice at 32 East 64th Street with in-kind replacement of stamped zinc ornament provided for thorough rehabilitation of the cornice at an acceptable cost (*see figure 12*). The utilization of stock replacements of lions' heads, modillions, and moldings resulted in some savings and hastened delivery of stamped ornament with little effect on the appearance of the rehabilitated cornice. A change of the cornice roof edge detailing to prevent further leaking was the only significant change made to the original design.

Figure 11. The completed cornice is shown after painting and immediately prior to removal of the scaffolding. Photo: Richard Pieper.

Figure 12. Detail of the completed cornice shows the new zinc modillion and the leaf and egg and dart moldings attached to the historic cornice. This repair approach, which involves in-kind replacement of deteriorated components, is the recommended treatment for such distinctive features as this cornice. Photo: Michael Devonshire.

PROJECT DATA

Building:
32 East 64th Street Building (formerly "The Verona")
64th Street and Madison Avenue
New York, New York

Owner:
32 East 64th Street Corporation
(A residential cooperative)

Project Date:
1987-1988

Architect:
Jan Hird Pokorny, Architects and Planners
306 East 51st Street
New York, New York
Project Director
Richard Pieper
Project Conservator
Michael Devonshire

Contractor:
L.P. Kent, Inc.
P.O. Box 207, Fordham Station
Bronx, New York

Supplier:
Stamped Zinc Ornament—
W.F. Norman Company
Nevada, Missouri

Project Cost:
The rehabilitation construction cost for 260 linear feet of cornice, including all scaffolding costs, was approximately $2300 per linear foot. (The cost of removing the cornice would have been approximately $1000 per linear foot.)

This PRESERVATION TECH NOTE was prepared by the National Park Service. Charles E. Fisher, Preservation Assistance Division, National Park Service, serves as Technical Editor of the series. The author gives special thanks to the following people who contributed to the production of this TECH NOTE: Michael Devonshire and Dale Flynt at Jan Hird Pokorny Architects, and Michael Auer and Annette Dixon-Roberson of the National Park Service. Cover Photo: View of "The Verona" circa 1908. Courtesy of the Museum of the City of New York.

PRESERVATION TECH NOTES are designed to provide practical information on traditional practices and innovative techniques for successfully maintaining and preserving cultural resources. All techniques and practices described herein conform to established National Park Service policies, procedures and standards. This Tech Note was prepared pursuant to the National Historic Preservation Act Amendments of 1980 which direct the Secretary of the Interior to develop and make available to government agencies and individuals information concerning professional methods and techniques for the preservation of historic properties.

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ISSN: 0741-9023 PTN - 32 October 1990